

Amendments to the Claims

1 1. (currently amended) A system for encoding a plurality of videos acquired
2 of a moving object in a scene by a plurality of fixed cameras, comprising:
3 means for determining camera calibration data of each camera of a
4 plurality of cameras;
5 means for concurrently acquiring a plurality of videos of the 3D
6 moving object in a scene with the plurality of cameras, in which there is one
7 video acquired by each camera;
8 means for associating the camera calibration data of each camera with
9 the video acquired by the camera;
10 means for determining a segmentation mask for each frame of each
11 video, the segmentation mask identifying only pixels in the frame associated
12 with the moving object;
13 a shape encoder configured to encode the segmentation masks;
14 a position encoder configured to encode a 3D position of each pixel;
15 ~~and~~
16 a color encoder configured to encode a color of each pixel; and
17 means for combining the encoded segmentations masks, pixel
18 positions and colors of the pixels to form a 3D bitstream representing the
19 moving object.

1 2. (currently amended) The system of claim 1, further comprising:
2 a multiplexer configured to combine outputs of the shape encoder, the
3 position encoder, and the color encoder into a single 3D bitstream.

- 1 3. (original) The system of claim 2, further comprising:
2 a decoder;
3 means for transferring the bitstream to the decoder; and
4 rendering a decoded bitstream from an arbitrary viewpoint using the
5 camera calibration data.
- 1 4. (original) The system of claim 3, in which the arbitrary viewpoint is
2 constrained in space.
- 1 5. (original) The system of claim 3, in which the arbitrary viewpoint is
2 unconstrained in space.
- 1 6. (original) The system of claim 1, further comprising:
2 means for maintaining a dynamic 3D point model defining a geometry
3 of the moving object.
- 1 7. (original) The system of claim 1, in which each point of the dynamic 3D
2 point model is associated with an identifier of one or more of the plurality of
3 cameras.
- 1 8. (original) The system of claim 1, in which the encoded segmentation
2 masks are compressed using a lossless compression, and the position and the
3 colors are encoded using a lossy compression.
- 1 9. (original) The method of claim 1, in which the camera calibration data are
2 updated periodically when any of the fixed cameras are relocated.

1 10. (original) The system of claim 1, in which the segmentation masks are
2 encoded using MPEG-4 lossless binary shape encoding, the positions
3 include depth values encoded as quantized pixel luminance values, and the
4 colors are encoded using MPEG-4 video object coding.

1 11. (original) The method of claim 1, in which the entire scene is encoded
2 using a scene specifying relations between static and dynamic portions of the
3 scene.

1 12. (original) The system of claim 1, further comprising:
2 a decoder configured to decode the encoded segmentation masks, the
3 encoded positions, and the encoded colors as an output video having an
4 arbitrary viewpoint using the camera calibration data.

1 13. (original) The system of claim 12, in which the arbitrary viewpoint is
2 different than a viewpoint of any of the cameras.

1 14. (original) The system of claim 12, in which images of the output video
2 are composited with a virtual scene.

1 15. (original) The system of claim 12, in which a playback frame rate of the
2 output video is different than a frame rate used to acquired the videos by the
3 plurality of cameras.

1 16. (original) The system of claim 8, in which the lossy compression scheme
2 is a progressive encoding using embedded zerotree wavelet coding.

1 17. (currently amended) The system of claim 1, in which the shape encoder
2 ~~use~~ uses MPEG-4 lossless binary shape encoding, the position encoder
3 encodes depth values, and the color encoder uses MPEG-4 video object
4 coding.

1 18. (original) The system of claim 1, further comprising:
2 means for partitioning each video into a plurality of segments, each
3 segment including a plurality of frames; and
4 means for encoding a key frame and difference frames of each
5 segment, using the shape encoder, the position encoder, and the color
6 encoder into a single bitstream.

1 19. (original) The system of claim 18, in which the key frames comprise a
2 base layer of an encoded video bitstream, and the difference frames
3 comprise an enhancement layer of the encoded bitstream.

1 20. (original) The system of claim 18, further comprising:
2 means for averaging the frames in each segment to construct the key
3 frame;
4 means for determining the difference frame for each frame in the
5 segment from the key frame and the frame.

1 21. (original) The system of claim 18, in which the key frame is a first frame
2 of the segment, and a difference frame is determined from a current frame
3 and previous frames in the segment.

1 22. (original) The system of claim 1, further comprising:
2 a surface normal encoder configured to encode a surface normal of
3 each pixel; and
4 a splat size encoder configured to encode a splat size for each pixel;
5 and
6 means for combining the outputs of the surface normal encoder and
7 the splat size encoder with the single bitstream.

1 23. (original) The system of claim 22, in which the surface normal vectors
2 are progressively encoded using an octahedron subdivision of a unit sphere
3 and the splat sizes are encoded as quantized codewords represented in a gray
4 scale MPEG video object.

1 24. (original) The system of claim 12, in which splat sizes and surface
2 normals are estimated from the positions.